No. 3, April 1982

SOLAR EUROPE

Newsletter of the Solar Energy Programme of the European Communities
Issued by the Directorate-General XII for Science, Research and Development

EC kicks off pilot projects for biomass conversion to liquid synthetic fuel

The Commission has selected four pilot projects in order to develop a variety of innovation technology for conversion of wood and other biomass resources into synthesis gas suitable for production of methanol.

Technical negotiations and a workshop with all competitors were successfully concluded in November 1981, and design work started at the beginning of this year. All plants will be realized by April 1984.

For the implementation of these projects, industrial consortia or international consortia, together with regional and national authorities, are in charge. These projects involve four different concepts, as shown below. The gasification capacity of these plants will stand at 12 to 120 tons of wood per day, producing up to 170,000 Nm3/day synthesis gas, a feedstock for about 50 tons of methanol. Total cost of the projects amounts to about 8 million ECU, of which 35% will be allocated by the Commission's budget.

The four concepts and the project contractors

- An oxygen donor process, composed of a double fluid bed for gasification with chemically bound oxygen produced separately from air and a reacting solid.
  Consortium Constructors John Brown Ltd., London, Wellman Mechanical Engineering Ltd., West Midlands (U.K.).
- A single pressurized fluidized bed reactor for gasification with oxygen.
  Consortium Creusot-Loire, Paris, Société Elf-Aquitaine, Compagnie Française des Pétroles Total,
  co-financing by French Solar Energy Commissariat (COMES).
- A two-stage fluid bed gasifier using steam in the first stage, oxygen in the second, and a fluid bed combuster providing heat for the first stage.
  Consorzio Biomassa Maremma, comprising AERIMPIANTI, Milan, AGIP Nucleare, and CESEN, Genoa.
- A single-stage fast fluid bed reactor, also called a circulating fluid bed reactor.
  Lurgi Kohle und Mineralöltechnik GmbH, Frankfurt am Main.

Changes at the Commission

In September 1981 Professor Paolo Fasella from Rome took over the D.G. XII from Dr. Günter Schuster. D.G. XII is now the Directorate General for Science, Research and Development.

The Member of the Commission in charge of D.G. XII is Vice-President Etienne Davignon. As from January 1982, the Solar Energy R & D Programme is part of a new Directorate E « Alternative energy, energy conservation, energy R & D strategy", headed by Dr. Albert Strub. Dr. W. Palz is confirmed as head of the solar programme.

Future issues of Solar Europe will be published as special issues of a newsletter on the broader area of new energies. Besides information on R & D, as part of D.G. XII's solar energy programme, it will include all solar activities of D.G. XVII for Energy, in particular their demonstration programme.

Circulating fluidized bed gasifier for coal. Within the EC pilot programme 'methanol from wood', the plant will be converted for wood conversion into a 'syngas'. (Werkphoto LURGI).

First large-scale photovoltaic solar generators in Europe

Commission gives green light for construction phase

Fourth EC Photovoltaic Solar Energy Conference
10-14 May 1982
Stresa, Italy

Programme outline

Monday 10 May Opening session,
Applications.

Tuesday 11 May Experience, Performance, Reliability, Monitoring; Systems, Components, Engineering, Flat-plate module technology.

Poster session Applications; Experience, Performance, Reliability, Monitoring, Systems, Components, Engineering.

Wednesday 12 May Fundamental Studies.

Poster session: Flate plate module technology; Fundamental studies, Advanced devices and concentration; Thin-film solar cell technology. **Gala dinner.**

Thursday 13 May Advanced devices and concentration; Thin film solar cell technology.

Poster session: Crystalline silicon solar cell technology; late news.

Friday 14 May Crystalline silicon solar cell technology.

The high reputation of the European Photovoltaic Conferences is clearly demonstrated by the enthusiastic response to the Call for Papers. Altogether, 260 abstracts were received from 30 countries. However, because of schedule and other limitations, the reviewers had to select 40 papers for oral presentation and 125 papers for the poster sessions. From the accepted papers, the Committee has assembled an attractive programme which will be published in the Conference Proceedings.

Enquiries

Before and after the Conference:

Public Relations and Press
JRC Ispra Establishment
I-21020 ISPRA (VARESE)
ITALY
Telephone: 332 789111 or 780131
Telex: 380042 or 380058 EUR I

During the Conference:

Palazzo dei Congressi
Piazzale Europa
I-28049 STRESA (NO)
Telephone: 323 31092
Telex: 20396

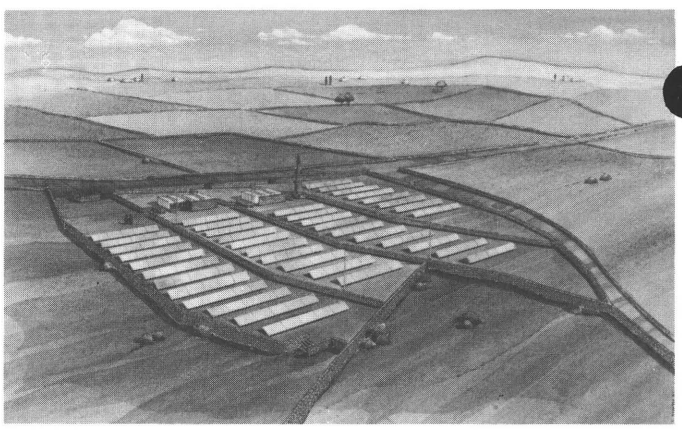
On 2 December 1981, the Commission approved the final designs for 16 of the 19 photovoltaic pilot projects which were selected previously (see Solar Europe No. 2).

The final design review was preceded by a preliminary design review in July and a design monitoring review in October 1981. During these meetings, the Commission had detailed discussions with the international consortia on topics such as the pv power conditioning systems, array structures, wind loads, batteries, lightning protection and failure detection. These exchanges of views led to many improvements in the concept of the projects.

Simultaneously, prototypes of the modules which will be used within the pv pilot projects or, when available, modules from series production were tested at the ESTI laboratory of the Commission's Joint Research Center at Ispra, Italy.

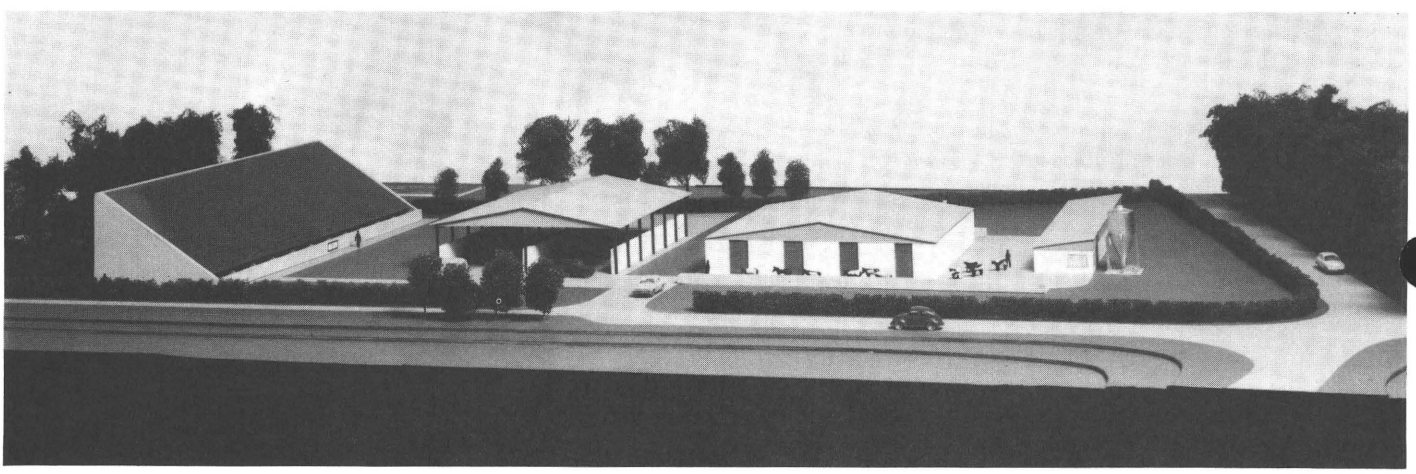
The next contractors' meeting will be held on 20-21 April 1982 in Brussels. Discussions will in particular concern the preparation of the sites and the infrastructure, the acceptance test and the future data monitoring programme.

All projects are expected to be completed by mid-1983.



Above: Artist's view of the 100 kWp project on Kythnos Island (Greece). The plant will feed the grid together with five wind generators of 20 kW and six diesel generators of 150 kW each.

At foot of page: Mock-up of the 50 kWp project supplying a dairy farm on Fota Island, near Cork (Ireland). The photovoltaic array will be used as the roof of the building on the left, which has been specially designed for this purpose.



Photovoltaic R & D contractors meet in Sorrento

The first meeting of the 34 photovoltaic contractors in the Commission's current 4-year solar energy R & D programme (Project C) took place at the Hotel Cocumella, St. Agnello di Sorrento, Italy on 23 and 24 March, 1981. The purpose of these meetings, which proved highly successful in the first 4-year programme, is to enable each contractor to present an up-to-date account of his work, to promote collaborative effort and encourage the exchange of information between groups working towards the common objectives of lower cost and higher efficiency. The presentations were reviewed the following day by the Project C Expert Group at a meeting in nearby Massa Lubrense.

In the field of silicon solar cells, the University of Leuven, Belgium reported good progress in the development of low-cost processes, such as screen-printed contacts and the diffusion of junctions and back surface fields from screen-printed layers. High yields of cells averaging 11% in conversion efficiency have been achieved with 76 mm wafers. Development of another low-cost process, junction formation by ion implantation, has also advanced significantly. CNR-Istituto LAMEL of Bologna, Italy claimed to have achieved efficiencies of over 15% with 10keV p^+ion implantation, followed by thermal or scanned electron beam annealing.

Interesting new work on the production of cheap polysilicon ingots was reported by Laboratoires de Marcoussis, France, who are developing a technique of orientated solidification in a graphite crucible under directional heat flow. The present work consists of constructing and optimising a prototype furnace capable of producing 15-20 kg ingots. Heliotronic of Burghausen, Germany presented interim results of an investigation of the structure of their 'Silso' cast polycrystalline silicon and Ansaldo claimed to have lifted the efficiency of production cells made from this material to 11.6% by a 2-step diffusion process.

LEP of Limeil-Brevannes, France reported on their RAD process, in which silicon ribbon is produced by pulling a graphite-coated paper substrate upwards through molten silicon. To date, 12m ribbons have been produced at a rate of 7 cm/min, yielding 1 cm^2 cells of 9.4% efficiency.

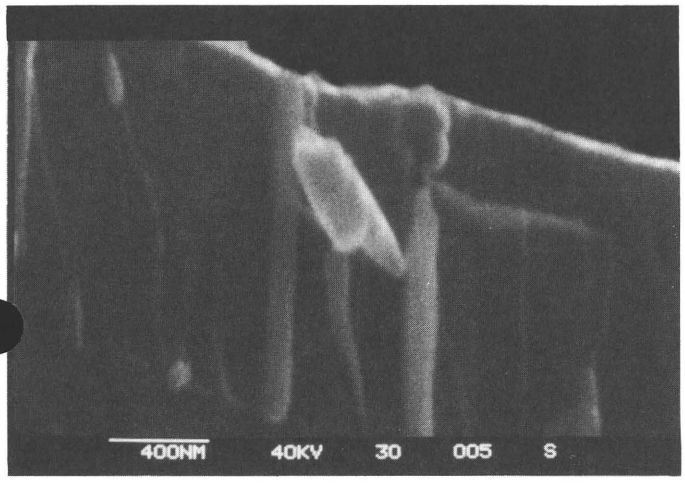
Prof. Spear of the University of Dundee, UK, working in collaboration with the Max Planck Institute, Heidelberg, Germany, gave a clear exposition of the problems facing workers in the field of hydrogenated amorphous silicon, one of the most promising approaches to a really cheap thin-film solar cell. Using p-i-n structures of up to 1 cm^2 in area, he has achieved efficiencies of between 5 and 6% with both gas-phase doping and Na-implanted junctions. Further improvements towards the 10% mark are expected as structures and fabrication techniques are refined. Three other contractors are investigating alternative a-Si structures with various sputtering methods.

With the other main thin-film contender, cadmium sulphide, most interest was aroused by a new approach which is being developed by a consortium headed by Thorn-EMI Ltd. of Hayes, Middlesex, UK. Their technique consists of producing very thin, large-area, pin-hole free CdS films by electrophoresis from a colloidal suspension and following this with a recrystallisation process to reduce resistivity. Considerable progress has been made in the first six months of this contract.

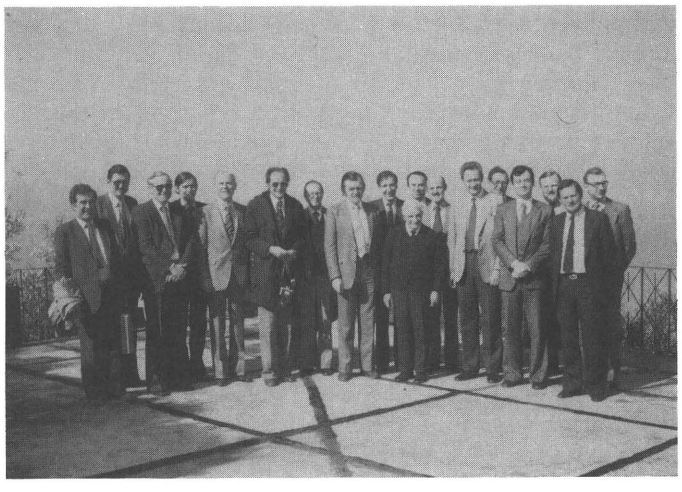
Another interesting highlight was provided by the University of Stuttgart, Germany in the group of contracts concerned with concentration. Their idea is to produce optical density variations in dichromated gelatine films on glass by laser irradiation, the patterns being generated by optical or synthetic holography. Such treated films can be used to split sunlight into two or more wavebands and to direct concentrated beams on to solar cells of suitably matched bandgaps. The principle of this cheap technique has been demonstrated and the idea is being developed. Cells suitable for spectrumsplitting applications, which can theoretically give efficiencies as high as 30%, are being developed in Italy by ENEL with CISE SpA of Milan and collaboration between this contractor and Stuttgart might prove fruitful.

An EUR Report containing all the presentations made at this meeting will be published in due course.

F. TREBLE



Crors section of an a-Si layer (Prof. Frova, University of Rome).



Project C Expert group, Massa Lubrense Italy, Wed. March 25, 1981.

The European Communities Solar Energy R & D Programme

Important achievements

The first Solar Energy R & D programme on an EEC level was started in 1975 and led to a number of important achievements which are summarized below.

In 1981 the Commission completed **Eurelios,** the world's first tower power plant which was built by an international consortium and in cooperation with the national programmes of Italy, France, Germany and Belgium. Successful inauguration took place on 29 May in full sunshine. The plant has operated satisfactorily with only minor problems since its completion. It has provided a good opportunity of gaining a better understanding of the technologies involved in tower power plants. Eurelios is now the joint property of ENEL and the CEC.

In the field of **solar heating in houses,** the Commission has supported many laboratories for testing of all kinds of collectors: simple flat plate as well as tubular, or air collectors. This has made it possible to lay down recommendations for European collector testing methods which will support European industry in its effort to improve its production quality standards for collectors.

The Commission has also pulled together existing experience on solar water heaters and solar houses, both active and passive. Performance data and other results for many operating systems have been critically reviewed and published for the better information of possible users of such systems. Cost evaluations are now also being included in these studies which are still going on.

Architectural competitions on passive solar architecture which concern mostly students have the benefit of promoting these new technologies among young architects.

For **solar radiation data,** the situation in Europe was very bad up till now. Certain member countries did not even have a network of well-maintained radiation measurements. No reliable results were published. The Commission has succeeded in raising the radiation network in all countries up to international standards and is publishing for the first time sets of comprehensive and reliable data on the available solar radiation which is an absolute necessity for any design engineer and user of solar energy systems in Europe.

The Commission's programme has from the beginning concentrated its efforts on **photovoltaics.** It had no leading role however for the development of silicon material and conventional silicon solar cells because this task had already been taken up and was well handled by the various national solar energy programmes. However, the Commission has given important stimulation to the development of polycrystalline silicon material and its introduction into production processes.

The Commission had a leading role in Europe for the development of alternative solar cells, in particular CdS cells, CdSe and amorphous silicon solar cells. The Commission has also been the leader for the development of large photovoltaic systems in the 100 kW range and even though this activity is far from being completed, it is already obvious that important new achievements in the field of low cost structures, cheap cabling of solar panels, power conditioning, batteries etc. will come about in the course of the Commission's photovoltaic pilot project programme. One immediate result is that Europe's photovoltaic industry is much better prepared for the important export markets which will develop in photovoltaics in the next few years.

In the **biomass field,** the Commission gave the first push in the years 1976-1979 to a larger utilization of straw and wood residues by means of newly developed furnaces. Meanwhile this has led to important industrial and commercial activities in all the member countries.

For **gasification** the Commission has a leading role in reviving European leadership which existed in this field before World War II. All major companies in the EC involved in gasification are being supported by the Commission's solar energy R & D programme. Gasification offers very important prospects for using cellulosic residues, which are available in many millions of tons in the European Communities, for energy purposes at a low cost. It also has prospects for new export activities.

The Commission is also implementing a number of **assessment studies** for the future benefit of design engineers, industrial companies and users. The results are currently becoming available on energy from biomass in Europe, the technico-economic situation for biogas utilisation, photovoltaic power for Europe, solar heating applications in the habitat, the prospects for thermal power plants, the potential of wind energy in Europe, and the situation of solar energy applications for heating purposes in agriculture and agro-industry.

Execution of the current four-year programme

The Commission's solar energy R & D programme extends over a four year period from July 1979 to June 1983 and has now entered its second phase. In the course of 1981 the rest of the budget was committed and by now all contracts are on their way. Funds for new contracts may only become available in the second half of 1983 in case the Council of Ministers decides on a third four-year programme which would then extend from 1983 to 1987.

The budgets which are actually being spent in each category are very close to those initially foreseen. Details of the budgets are as follows (target budgets as foreseen at the beginning of the programme are added in brackets).

(in million European Currency Units, ECU)

Project A		
Solar Energy Applications to Dwellings	8.2	(8.3)
Project B		
Thermo-mech. Solar Power Plants	4.7	(4.7)
Project C		
Photovoltaic Power Generation	15.91	(15.9)
Project D		
Photochemical, Photoelectrochemical, Photobiological processes	2.65	(2.6)
Project E		
Energy from Biomass	8.2	(7.4)
Project F		
Solar Radiation Data	1.8	(2.0)
Project G		
Wind Energy	1.18	(1.0)
Project H		
Solar Energy in Agriculture and Industry	0.6	(0.7)
Management	2.76	(3.4)
Total	46.00	

Three categories of pilot plant are now under construction or completed: Eurelios, on which all the budget allocated under Project B has been spent; photovoltaic pilot plants for which 10.1 million ECU have been spent by the Commission; and methanol production plants employing wood as a feedstock (Project E) with a budget of 2.78 million ECU.

In general, the Commission's contribution to the contracts does not exceed 50% of the total cost; in the case of the pilot plants it is rather between 30-40% of the cost. These R & D funds are not reimbursable.

The Commission's solar R & D programme includes three areas of activity: conversion of solar radiation into heat; production of fuels through photosynthesis; and electricity.

Unlike programmes on fusion or on nuclear power plants where work is concentrated on the development of one particular plant, solar energy research by its very nature has therefore to be much broader in scope. The current contract work includes a very wide variety of different technologies which can be illustrated just by the following few examples: chemistry and metallurgy for silicon material, crystal growing, solar cell development, low cost inverter development, low cost supporting structure development, photoelectrochemistry, photobiology, growing and harvesting of biomass, fermentation, furnaces, gasifiers, agricultural machinery for harvesting, optical concentration devices of various kinds, thermodynamic studies, meteorological aspects, collector development, heating and cooling systems, architectural aspects of building, wind generators and so on.

This is why a solar energy R & D programme must necessarily be interdisciplinary and many national programmes are actually set up in this way. To cover all these subjects properly and not to leave aside any technology which may become promising at a later stage, solar energy R & D programmes have to be very widespread and this is also the case for that of the European Communities.

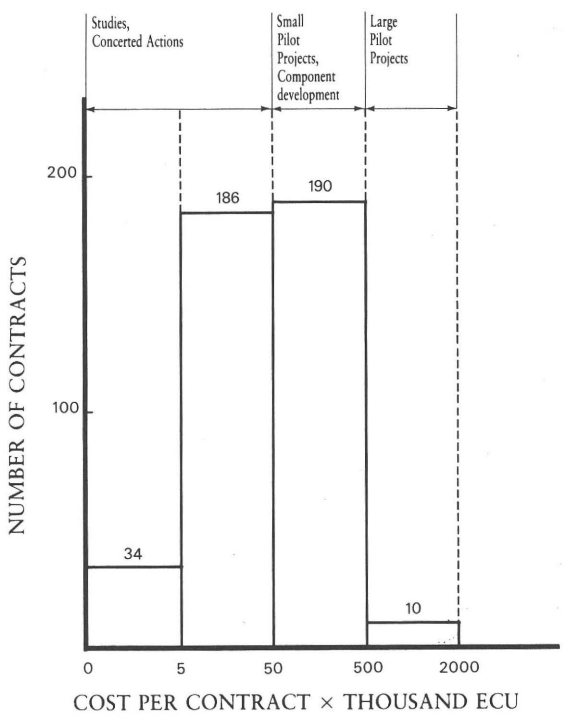
Actually the Commission in its current second 4-year R & D programme has concluded several hundred contracts to cope with this important task. The projects are spread all over the member countries of the European Communities. So far the programme has certainly had a leading role for European solar energy research in many areas and in many of the member States.

Pilot programmes. To avoid too strong a dispersion and dilution of efforts over the wide areas involved in solar energy R & D, the Commission has set up a new concept since 1979. It is called the pilot projects which have been started in the photovoltaic field in 1980 and for methanol from biomass in 1981. In this concept an attempt is made to develop a network of pilot projects which are set up in as many E.C. countries as possible. Contracts are given to international consortia to strengthen the cooperation across national borders. The pilot projects include the integrated development of all the various technologies in a certain area, in particular in photovoltaics where the pilot programme includes 16 projects. Module development and testing is included as well as general power plant design and power conditioning studies, cabling problems, support structure development, batteries, grid connection and various stand-alone applications. All major photovoltaic companies in the EC have benefited from the support offered by the Commission's programme.

For methanol from wood, four projects are being set up in the UK, France, Italy and Germany and will no doubt strengthen Europe's position in the very promising field of gasification of cellulosic material. This area is also related to some extent to coal research.

The pilot programme is a major achievement in the Commission's solar energy R & D programme with a view to an integrated technological development and to strengthening industrial cooperation throughout the European Community.

A list of all contracts is available on request. Please write to: Commission of the European Communities, Directorate-General XII for Science, Research and Development, Solar Energy Programme, Rue de la Loi 200, B-1049 Brussels.



Distribution of budget by type of contract

Distribution of contracts in the current programme

Type of Organisation	No. of contracts of solar programme
Industries	136
Research centres	117
Universities	167
Total	420

The table shows that there exists a good balance between contracts with industry, research centres and universities. There are contracts with large and small industries. In general, contracts with industries involve a larger budget than the others, thus the largest share of the overall solar budget goes to industry.

Photobiological and Photochemical Conversion

Contractors meeting at Cadarache, 26-28 October 1981

The production of hydrogen or other fuel such as fixed C or N by the photochemical, photoelectrochemical or photobiological dissociation of water is one of the most attractive possibilities for the utilization of solar energy. The substrate (water) and the sunlight 'interact' via a catalytic system to produce hydrogen (or possibly fixed carbon or nitrogen instead, in newly studied systems). This is a very new area of research having only been developed from discoveries made in 1972 in the chemical and biological fields. The European Commission was far-sighted in its formulation of a Solar Energy Programme in 1974 to include this field of research. It is an area of basic directed research which could have significant implications for solar energy conversion systems in the future. There is more emphasis in this programme on the new photochemical processes for water splitting, overlaps with photoelectrochemistry using semiconductors, photoredox batteries, and on the use of different photosynthetic organisms which can be genetically manipulated especially when studying the water-splitting system. We are also now including work on photochemical CO_2 and N_2 fixation to produce organic compounds and ammonia.

The recent exciting discoveries by photochemists in Europe and Japan on the photochemical splitting of water for H_2 and O_2 production (using metal and rare earth complexes in dye solutions) are well represented in our programme. The photobiological metal-protein complexes involved in water splitting in membranes are now being much investigated as a result of increasing interest and progress in the USA — our programme incorporates important work in this field. Already important discoveries and developments are being made with increasing frequency and we in Europe are certainly in the forefront of these developments. Over the next two years we can look forward to improvements in the understanding of how the photochemical and photobiological systems function. Hopefully we can start synthesising stable systems for water-splitting to produce H_2 and to possibly fix CO_2 and N_2. These may be able to be incorporated into solid matrices in single or combined systems.

D. HALL

Second EC Energy from Biomass Conference

20-23 September 1982
International Congress Center
Berlin, Germany

Areas to be covered by the programme:

Biomass resources
Energy plantations,
Improving biomass productivity,
Algae for biomass and high energy products.

Implementation in industrialized countries
Technology of heat and power production from solid biomass,
Biogas from agricultural, industrial and urban waste,
Energy plantation schemes (Sweden)
Environmental economic and social aspects.

Implementation in developing countries
Fuel wood — present and future
Gasifiers and kiln technology
Biogas from agriculture and domestic waste
Economic and social aspects.

Liquid fuels
Thermochemical conversion and methanol routes
Biological conversion ethanol and alcohol routes
Vegetable oil: preparation, utilization and technology
Economic and social aspects.

Keynotes
Biomass in Europe
Bio-energy in the North-South dialogue
Role of biotechnology in bio-energy
Chemicals from biomass.

Organized by the Commission of the European Communities in cooperation with Senat von Berlin, Bundesministerium für Forschung und Technologie, Bundesministerium für Ernährung, Landwirtschaft und Forsten
Concurrently with the Biomass Berlin International Exhibition

Biomass Berlin 1982 International Exhibition

20-23 September 1982 at the
Berlin Exhibition Grounds,
adjoining the International Congress Centre

For the first time in Europe the equipment for handling and processing biomass will be exhibited

Sectors dealt with

1. Anaerobic treatment (digestion without the addition of oxygen) of organic waste materials such as paper, food and drink, waste products from slaughterhouses, other animal waste, sewage.
2. Treatment of combustible materials such as straw, wood and refuse.
3. Mechanical processing, such as compacting, chipping, hogging and granulation.
4. Gasification, charcoal production.
5. Biofuel engines, use in automobiles and stationary use.
6. Fermentation to gasohol.
7. Aquatic plant technology.
8. Biomass production — forestry and agricultural equipment, planting, thinning and harvesting equipment.
9. National R & D programmes.

Organized by Ausstellungs-Messe Kongress-GmbH
with the patronage of the Commission of the European Communities.

Important events and meetings, April to December 1982

23 April	Coordination meeting of contractors, Solar Energy in Agriculture and Industry (Project H), Brussels
20-21 April	Progress review meeting, Photovoltaic pilot projects (Project C), Brussels
5-7 May	Coordination meeting of contractors, Energy from Biomass (Project E), Brussels
10-14 May	Fourth EC Photovoltaic Solar Energy Conference, Stresa, Italy
8 June	Coordination meeting of contractors, Wind Energy (Project G), Brussels
14-16 June	Coordination meeting of contractors, Solar Energy Applications to Dwellings (Project A) Meersburg (FR Germany)
21-22 June	Assessment meeting: Biogas in Europe Braunschweig (FR Germany)
20-23 Sept.	Second EC Conference Energy from Biomass, International Congress Center, Berlin (West), Germany
27-30 Sept.	Sixteenth IEEE Photovoltaic Specialists Conference organized in cooperation with the CEC, San Diego, California
12 Oct.	Final design review meeting, Methanol from wood Pilot Plants (Project E) Frankfurt (FR Germany)
19 Oct.	Coordination meeting of contractors, Solar radiation data (Project F), Brussels
16-17 Nov.	Coordination meeting of contractors, Photovoltaic Power Generation (Project C) Brussels
6-8 Dec.	Coordination meeting of contractors, Photobiological, photochemical conversion (Project D), Brussels
13-16 Dec.	Passive Solar Research and Design Conference, organized in cooperation with the CEC, Cannes, France

New books

Published for the Commission of the European Communities

Published by D. Reidel Publishing Co. Holland

Medium-Size Photovoltaic Power Plants
Proceedings of an EEC/DOE Workshop hosted by the Commissariat à l'Energie Solaire, held in Sophia-Antipolis, France, 23-24 October 1980. US$26.50 ISBN 90-277-1279-4 (EUR 7090)

Third EC Photovoltaic Solar Energy Conference
Proceedings of the International Conference at Cannes, France, 27-31 October 1980. US$81.50 ISBN 90-277-1230-1 (EUR 7089)

Energy from Biomass
Proceedings of the EC Contractors Meeting held in Copenhagen, 23-24 June 1981. Series E, Volume 1 (EUR 7420) US $28 ISBN 90-277-1348-0

Energy from Biomass
Proceedings of the Workshop on Biomass Pilot Projects on Methanol Production and Algae, Held in Brussels, 22 October 1981. Series E, Volume 2 (EUR 7667) ISBN 90-277-1370-7

Photochemical, Photoelectrochemical and Photobiological Processes
Proceedings of the EC Contractors' Meeting held in Cadarache, 26-28 October 1981. Series D, Volume 1 (EUR 7666) ISBN 90-277-1371-5

Solar Energy Application to Dwellings
Proceedings of the EC Contractors' Meeting held in Athens, 11-13 November 1981. Series A, Volume 1 (EUR 7664) ISBN 90-277-1372-3

Proceeding of the Final Design Review Meeting on EC Photovoltaic Pilot Projects,
held in Brussels 30 November, 1/2 December 1981. Series C, Volume 1 (EUR 7665) ISBN 90-277-1386-3

Published by Applied Science Publishers, England

Energy from Biomass — 1st EC Conference
Proceedings of the International Conference held at Brighton, UK, 4-7 November 1980 (EUR 7091) ISBN 0-85334-970-3

Published by Pergamon Press, Oxford, UK

Solar Energy Applications in Houses (F. JÄGER)
Performance and economics in Europe (EUR 7348) ISBN 0-08-027573-7

Published by the Architectural Press, London

Passive Solar Architecture in Europe
Results of the First European Passive Solar Competition, 1980. £9.95 (EUR 7291) ISBN 0-85139-961-4

Published by Technique et Documentation, Paris

L'énergie solaire au service du développement (in French) (EUR 6377) ISBN 2-85206-074-4

Published by CSARE (Via del Rio Starto, 3, 30174 Mestre — Venezia)

Energia da Biomassa in Europa (in Italian) Lit. 24 000

Available from Energy Conscious Design, 44 Earlham Street, London WC2

Solar Houses in Europe, an illustrative slide package. £9.90 (15% VAT in UK) (EUR 7344)

Published by Unesco

L'électricité solaire, les énergies nouvelles (W. Palz). Dunod, FF 160.

Energia solar e fontes alternativas (W. Palz). Hemus, Sao Paolo.

Elettricità dal sole (W. Palz). Tecniche Nuove, Milano.

Produced by the BBC

«Sol»,
a 30-minute film in English, French, Italian and German. Presents research work in the European Community which has led to practical solar energy applications in France, Ireland, Germany and Italy. Available from CEC at cost of copying film.

Reports issued by the CEC

Production de paille de céréales et de tiges de maïs à des fins énergétiques. Production photosynthétique de matière organique (Groupe E)	EUR 7018 FR
Entwicklung von einkristallinen CdS-Solarzellen für terrestrische Anwendung, geeignet für den Einsatz in optischen Konzentratoren.	EUR 7033 DE
Dépôt de couches de silicium polycristallin à partir d'un bain sur des substrats en carbone.	EUR 7079 FR
The growth of silicon layers from the vapour phase on a liquid metal layer.	EUR 7080 EN
Development process of silicon films obtained by rheotaxy on tinned sheet for solar cells.	EUR 7081 EN
Recrystallization of amorphous and small grain size polycrystalline silicon.	EUR 7082 EN
Development of low cost cadmium sulphide sintered ceramic ribbon solar cells for terrestrial applications.	EUR 7083 EN
The production of energy by photobiological methods.	EUR 7084 EN
Influence of surface structure and surface absorbates on solid phase epitaxial growth.	EUR 7092 EN
Process of deposition of single crystal silicon directly from the vapour phase.	EUR 7093 EN
Investigation on ion implantation as a technique suitable to fabricate high-efficiency silicon solar cells.	EUR 7094 EN
Amélioration des performances de la pile solaire au silicium de grand diamètre.	EUR 7095 FR
i) Evaluation of thin Pd, Pt and Ni silicides Schottky barriers for silicon solar cells ii) Large area uniform growth of Si layer by solid phase epitaxy	EUR 7096 EN
Optimization of silicon solar cells intended to be operated under medium solar concentration.	EUR 7097 EN
Technologie industrielle d'encapsulation economique et fiable pour panneaux solaires de grandes dimensions.	EUR 7163 FR
Bestimmung der Globalstrahlung unter Verwendung von Satellitendaten.	EUR 7299 DE
Selection methods for production of Test Reference Years.	EUR 7306 EN
Short Interval Met. Data for Computational Methods.	EUR 7307 EN
Predetermination of irradiation on inclined surfaces for different European centres.	EUR 7308 EN
Selection Methods for Production of Test Reference Years.	EUR 7311 EN
Estimation de l'Irradiation Solaire Journalière sur des Surfaces Réceptrices Orientées et Inclinées.	EUR 7312 EN
Development of Discrete and Continuous Spectral Measurements of Global Solar Radiation.	EUR 7375 EN
Regional Analysis of potential energy production from agricultural wastes.	EUR 7537 EN
Handling and storage of chopped straw for heating purposes.	EUR 7538 EN
Photoinduced redox reactions in facultative photosynthetic bacteria with special attention to the photosynthetic generation of low potential reducing equivalents.	EUR 7539 EN
Use of immobilized hydrogenase for hydrogen production.	EUR 7540 EN
An assessment of how the forest production which is currently not used would be obtained for energy purposes and from this an evaluation of the management methods most appropriate to the production of wood for energy purposes.	EUR 7550 EN
L'estimation en bois total des taillis et des houppiers des arbres « chêne » et « hêtre » à partir des données de l'inventaire forestier national.	EUR 7551 FR
The establishment of a permanently expressed hydrogenase in photosynthetic prokaryotes by means of genetic alteration and metabolic inhibition.	EUR 7552 EN
Genetic control of photosynthetic efficiency and hydrogen production in algae.	EUR 7554 EN
Estimation des potentialités d'utilisation du territoire pour l'énergie solaire à partir de critères pédoclimatiques, topographiques et de la productivité des cultures des prairies et des forêts — Le cas de la France.	EUR 7555 FR
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Entwicklung einer Energiegewinnungsanlage zur Erzeugung von Wärme, Mechanischer und Elektrischer Energie durch Vergasung von Holz und Stroh im Stückvergaser für den Leistungsbereich von 50-150 kW, erweitert auf « Vergasung Stückiger Biomasse im Leistungsbereich von 150-400 kW, Konstruktion und Bau einer Vegaserversuchsanlage ».	EUR 7558 DE
Production d'Energie Mécanique par Gazéification de la Paille.	EUR 7559 FR
Algal biomasses.	EUR 7560 EN
The development of a straw-burning furnace, to be used initially in conjunction with a crop drying plant.	EUR 7562 EN
Effect of the electrical field in the membrane of photosynthesis.	EUR 7566 EN
The working mechanism of hydrogenase.	EUR 7567 EN
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Photocatalytic production of hydrogen from water, using sunlight.	EUR 7607 EN
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European Currency Unit (ECU)

Equivalent in national currencies as at Januar 1982

Europe			*Other Currencies*		
Belgium	BF	41.68	United States	US$	1.10
Denmark	DKR	7.98	Switzerland	SFR	1.95
Germany, FR	DM	2.45	Spain	PTA	105.24
Greece	DRA	62.71	Sweden	SKR	6.03
France	FF	6.19	Norway	NKR	6.33
Ireland	IRL	0.69	Canada	Can.$	1.30
Italy	LIT	1 306.44	Portugal	ESC	71.13
Netherlands	HFL	2.68	Austria	ÖS	17.14
United Kingdom	UKL	0.57	Finland	FMK	4.74
			Japan	YEN	238.22
			Australia	Aus.$	0.97
			New Zeeland	NZ$	1.32

This newsletter was prepared by W. Palz and L. Crossby.